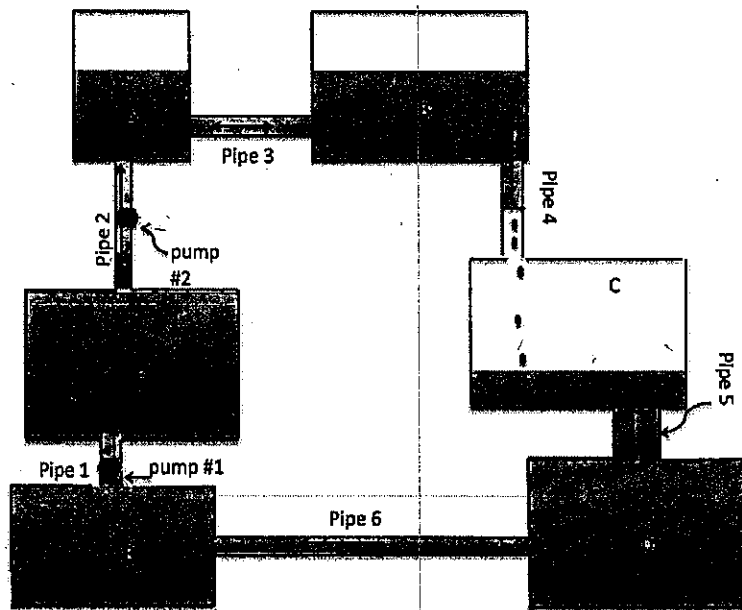


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GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Vapor in Atmosphere	Gas
Container B	Liquid in Atmosphere (cloud)	Liquid
Container C	Liquid Water on Surface	Liquid / solid
Container D	Groundwater	Liquid
Container E	Stream	Liquid
Container F	Lake	Liquid
Pipe 1	discharge	Liquid
Pipe 2	Evaporation	Liquid to Gas
Pipe 3	Condensation	Gas to Liquid
Pipe 4	Precipitation	Liquid / solid
Pipe 5	Infiltration	Liquid
Pipe 6	discharge	Liquid

Part 2: Group Work

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	③ Equilibrium
Water is pumped in Pipe 2	Energy is used for evaporation	④ Energy
Water drips in Pipe 4	Precipitation	① Gravitational Energy
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	②/③ Equilibrium

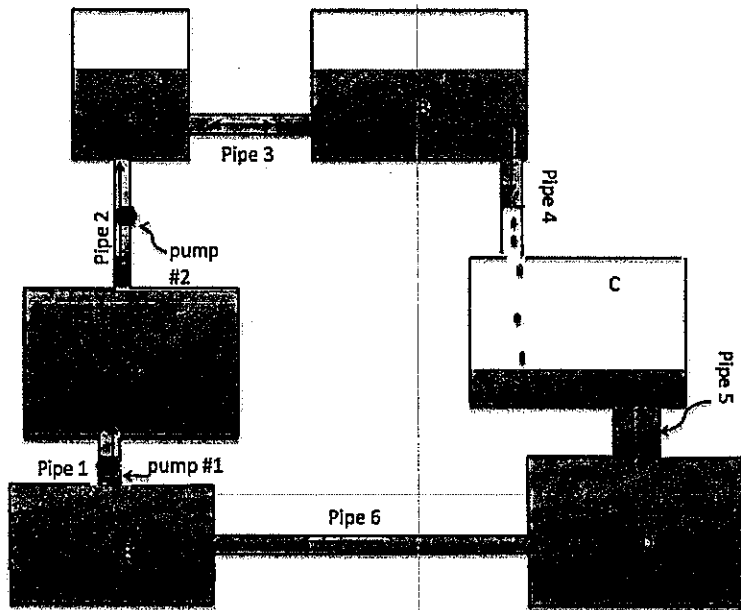
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Without condensation, there cannot be precipitation. Because gravitational energy drives streams and precipitation recharges the streams, the streams would eventually run dry.

GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	water vapor in atmosphere	Gas
Container B	liquid water in clouds	Gas to liquid
Container C	water at surface	liquid
Container D	Groundwater	liquid
Container E	liquid water surface	liquid
Container F	Ocean	liquid
Pipe 1	discharge	liquid
Pipe 2	evaporation	liquid to gas
Pipe 3	condensation	gas to liquid
Pipe 4	Precipitation	liquid/solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

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Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	1, 3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1, 3
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2, 3

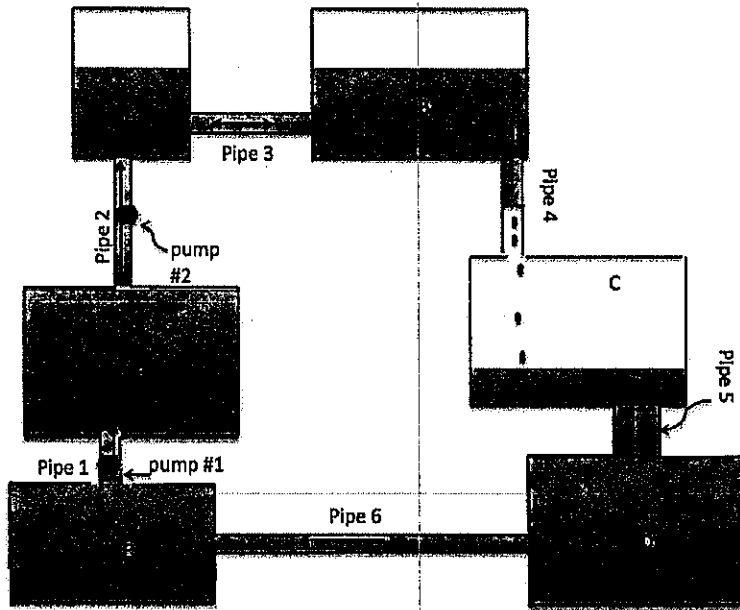
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

If Earth lacked the process of condensation the water vapor in the atmosphere liquid water in clouds would not be formed. Therefore, no precipitation would lead to a lower water flow in streams.

GROUP #: 3

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	<i>atmosphere</i>	<i>gas</i>
Container B	<i>cloud</i>	<i>liquid</i>
Container C	<i>surface water</i>	<i>liquid</i>
Container D	<i>Groundwater</i>	<i>liquid</i>
Container E	<i>stream</i>	<i>liquid</i>
Container F	<i>lake</i>	<i>liquid</i>
Pipe 1	<i>discharge</i>	<i>liquid</i>
Pipe 2	<i>evaporation</i>	<i>gas</i>
Pipe 3	<i>condensation</i>	<i>water</i>
Pipe 4	<i>precipitation</i>	<i>liquid</i>
Pipe 5	<i>Infiltration</i>	<i>liquid</i>
Pipe 6	<i>discharge</i>	<i>liquid</i>

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	Principle 3
Water is pumped in Pipe 2	Energy is used for evaporation	Principle 4
Water drips in Pipe 4	Precipitation	Principle 1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	Principle 2 and 3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

This would affect flow in streams by there no longer being any condensation in the atmosphere which leads to there being no clouds. This would lead to no precipitation to recharge the streams.

4

Group #4

ISP203A – Global Change
Reservoirs

Part 1: Class Activity – Analogy between Simple System and Water Cycle

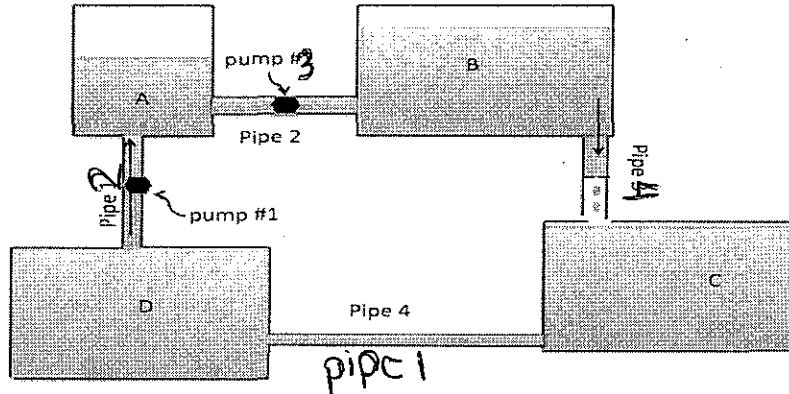


Table A. Aligning the system to the water cycle.

Simple system	Water cycle	Phase*
Container A	Water vapor in atmosphere	Gas
Container B	liquid water condensation	liquid
Container C	liquid water @ surface	liquid/solid
Container D	liquid @ cliff certain place	liquid
Pipe 1	Surface runoff	Liquid
Pipe 2	evaporation	vapor/liquid-gas
Pipe 3	condensation	gas-liquid
Pipe 4	precipitation	liquid

*If there is a phase change represented by an object, write both in the Phase column.

4

ISP203A – Global Change Reservoirs

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	Gravitational
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	3

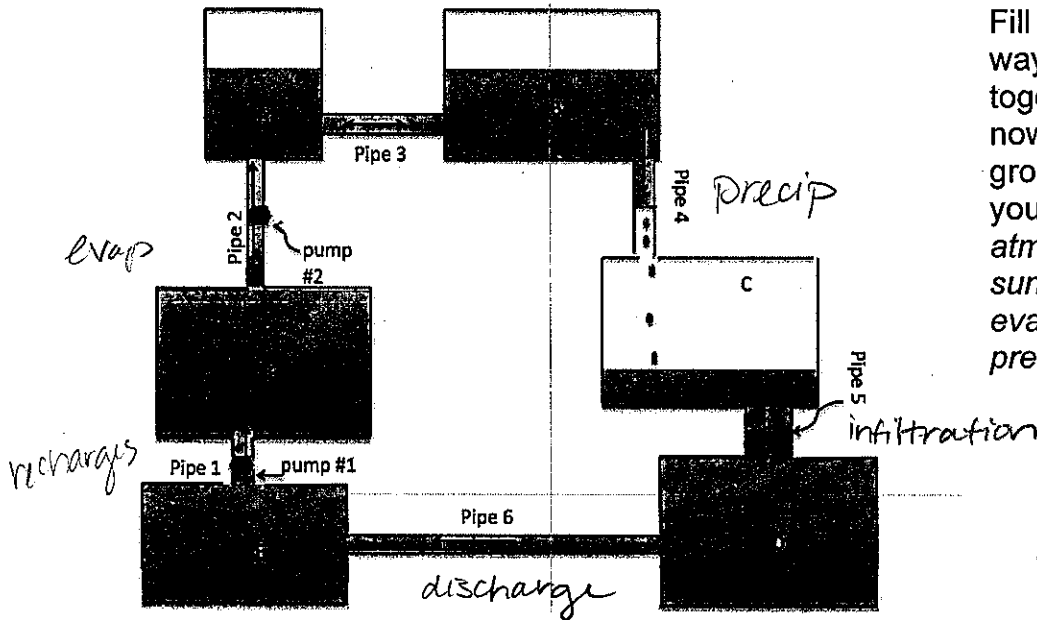
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

If condensation were to stop, then it wouldn't be possible for water to precipitate after it has been evaporated and the flow of water into streams would stop because the water would not be recharged back into the system.

GROUP #: 5

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	water vapor	gas to liquid
Container B	clouds	liquid
Container C	liquid water @ surface	liquid
Container D	Groundwater	liquid
Container E	another source of groundwater	liquid
Container F	body of water (ie lake)	liquid
Pipe 1	recharge	liquid
Pipe 2	evaporation	liquid to gas
Pipe 3	condensation	gas to liquid
Pipe 4	precipitation	liquid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	principle # 3 & 2
Water is pumped in Pipe 2	Energy is used for evaporation	# 1
Water drips in Pipe 4	Precipitation	# 4
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	# 1

Question:

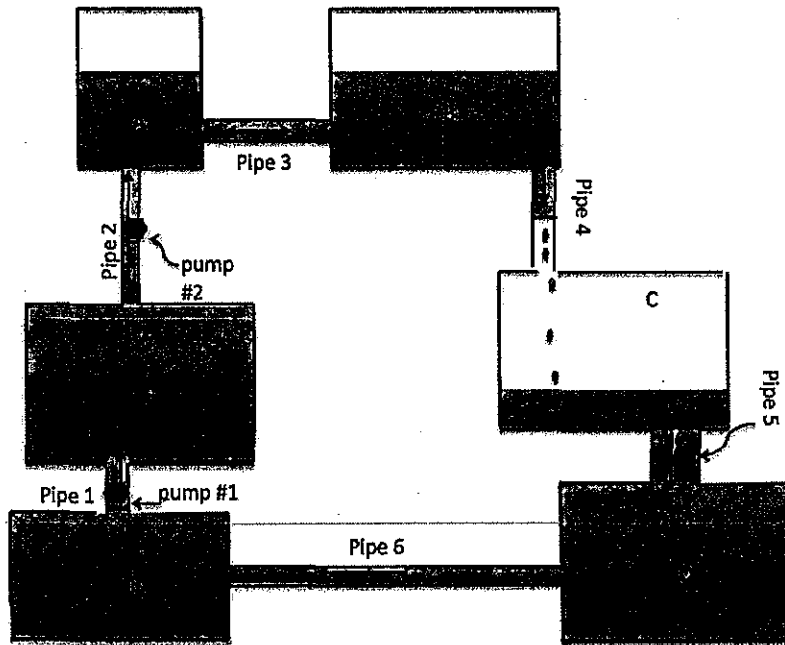
A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

The streams would continue to evaporate but the water vapor in the atmosphere can not condense & recharge.

6

ISP203A – Global Change Reservoirs

Part 2: Group Work



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	water in atmosphere	gas
Container B	cloud	liquid
Container C	water surface lake	liquid
Container D	Groundwater	liquid
Container E	stream	liquid / solid
Container F	lake	liquid / solid
Pipe 1	discharge	liquid
Pipe 2	evaporation	liquid to gas
Pipe 3	condensation	gas to liquid
Pipe 4	precipitation	liquid / solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	1
Water is pumped in Pipe 2	Energy is used for evaporation	3
Water drips in Pipe 4	Precipitation	4
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2

Question:

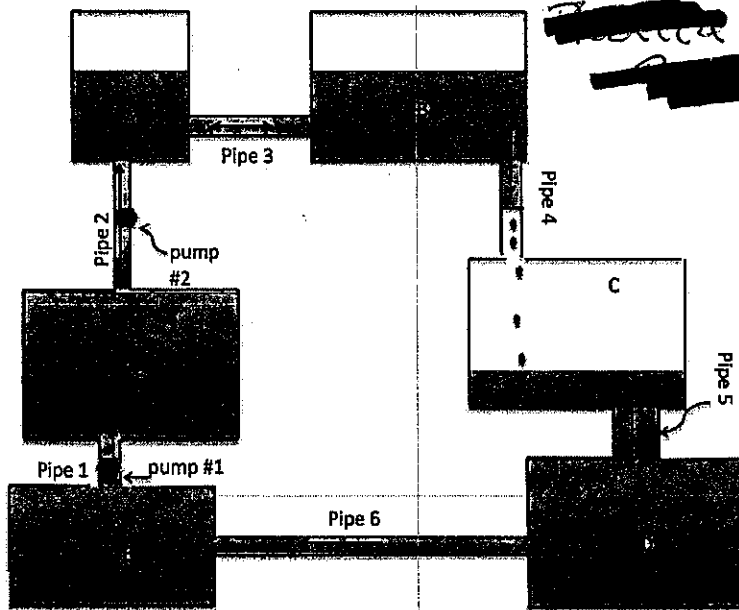
A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

The streams would dry out w/out condensation.

Cycle: liquid H₂O → surface runoff → evaporation

GROUP #: 7

GROUP MEMBERS PRESENT: [REDACTED]



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Water ^{Gas} in Atmosphere	Gas
Container B	Water in Clouds	Liquid/Solid
Container C	Surface Water	Liquid
Container D	Groundwater	Liquid
Container E	Stream	Liquid
Container F	Lake	Liquid
Pipe 1	Stream Discharge	Liquid
Pipe 2	Evaporation	Gas
Pipe 3	Condensation	Gas/Liquid
Pipe 4	Precipitation	Liquid/Solid
Pipe 5	Infiltration	Liquid
Pipe 6	discharge	Liquid

Causal Principles

When components of two domains are ~~analogous~~, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	2, 3 2, 3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	3, 2

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

if there wasn't condensation, there would not be liquid in the clouds ~~water~~, which would affect precipitation. There would not be groundwater for the streams.

Part 2: Group Work

Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.

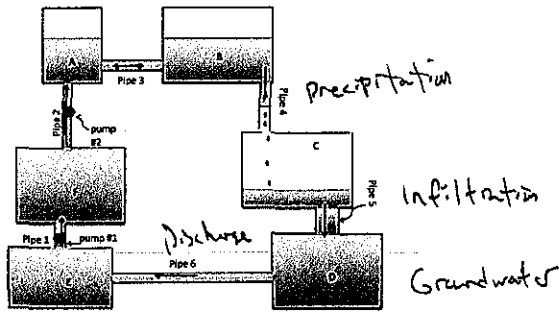


Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Water vapor in Atmosphere	Gas
Container B	Liquid in Clouds	Liquid / Solid
Container C	Surface water	Liquid
Container D	Groundwater	Liquid
Container E	Stream	Liquid
Container F	Lake	Liquid
Pipe 1	Discharge	Liquid
Pipe 2	Evaporation	Liquid to gas
Pipe 3	Condensation	Gas to liquid
Pipe 4	Precipitation	Liquid / Solid
Pipe 5	Infiltration	Liquid
Pipe 6	discharge	Liquid

ISP203A – Global Change
Reservoirs

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

1-5

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2

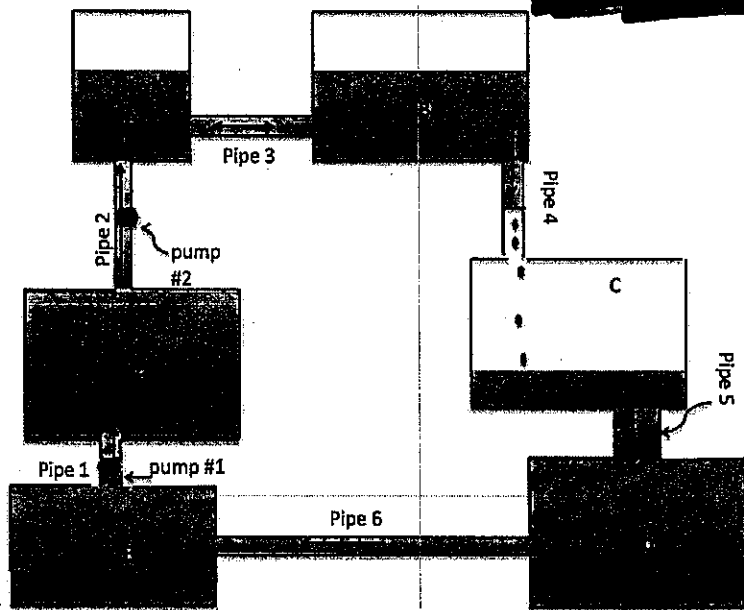
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Water in streams would eventually run out. This is due to the water cycle no longer being a cycle, since gas wouldn't be able to turn into a liquid.

GROUP #: 9

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Water vapor in atmosphere	Gas
Container B	liquid water in clouds	liquid
Container C	Precipitation reaching ground	liquid
Container D	Groundwater	liquid
Container E	Stream	liquid
Container F	Surface water stored in lakes	liquid
Pipe 1	Discharge	liquid
Pipe 2	Evaporation	liquid to gas
Pipe 3	Condensation	Gas to liquid
Pipe 4	Precipitation	liquid/solid.
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Part 2: Group Work**Causal Principles**

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	# 2
Water is pumped in Pipe 2	Energy is used for evaporation	# 4
Water drips in Pipe 4	Precipitation	# 1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	# 3 or # 2

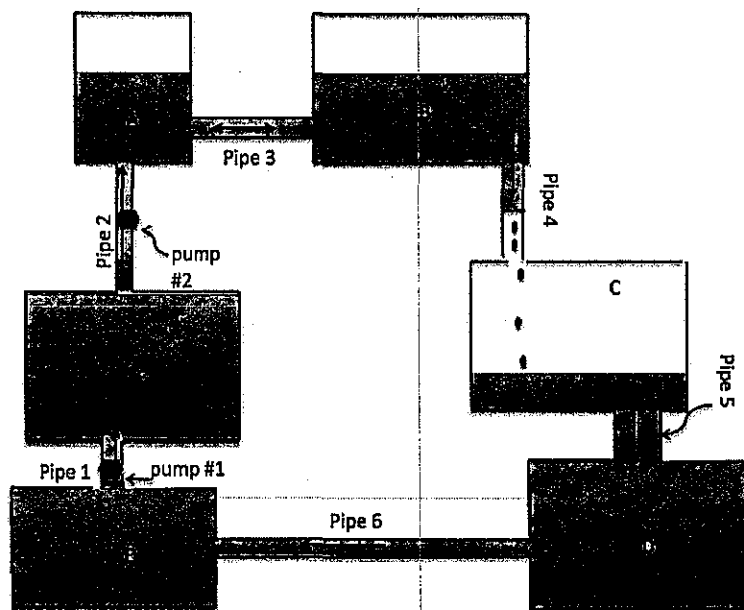
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

IF Condensation stops, it wouldn't be turning from gas to liquid so it would remain a gas in the atmosphere & then it couldn't precipitate. So, streams would dry up because this stops the cycle in the atmosphere.

GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Atmosphere	Gas
Container B	cloud	Liquid
Container C	Surface Water	Liquid
Container D	Groundwater	Liquid
Container E	Stream	Liquid
Container F	Lake	Liquid
Pipe 1	Discharge	Liquid
Pipe 2	Evaporation	Liquid to gas
Pipe 3	Condensation	Gas to liquid
Pipe 4	Precipitation	Liquid
Pipe 5	Infiltration	Liquid
Pipe 6	discharge	Liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

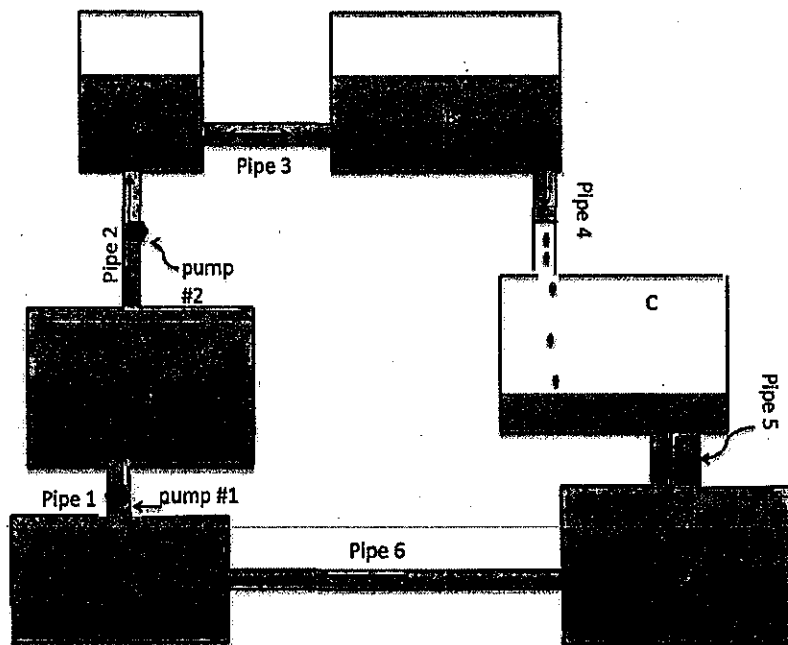
Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	#2
Water is pumped in Pipe 2	Energy is used for evaporation	#4
Water drips in Pipe 4	Precipitation	#1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	#3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

The water in the streams will receive no discharge from groundwater, which in return would not be recharged by precipitation. This would ultimately lead to drying of streams and throw off the water cycle.

Part 2: Group Work



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	water vapor in atmosph	gas
Container B	cloud liquid water in atmosphere	liquid
Container C	liquid/solid water on surface	liquid/solid
Container D	Groundwater	liquid
Container E	liquid water at stream diff surface place	liquid
Container F	liquid water at lake diff surface place	liquid
Pipe 1	recharge	liquid
Pipe 2	evaporation	liquid → gas
Pipe 3	condensation	gas → liquid
Pipe 4	precipitation	liquid/solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	atmosphere liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

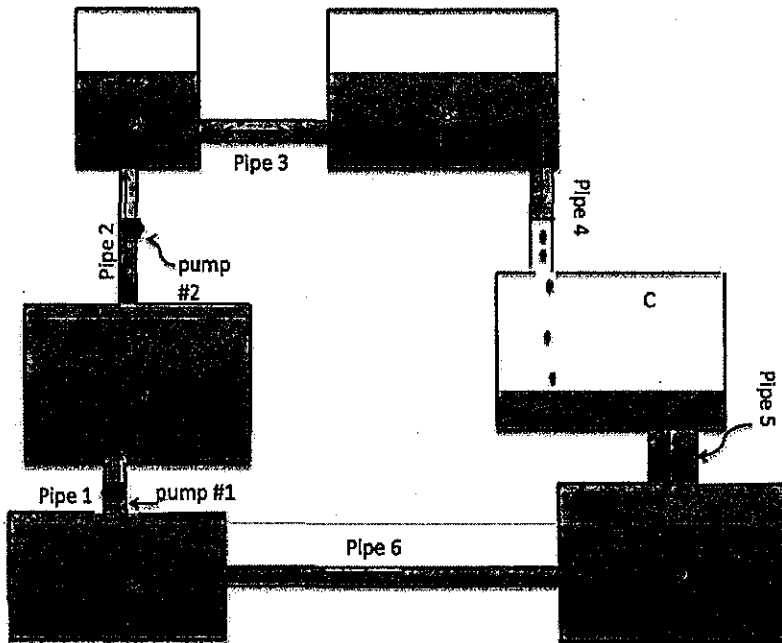
Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

All of the water would evaporate.
Surface water would dry out because
in order to have precipitation you must
have condensation.

Part 2: Group Work



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	atmosphere	gas
Container B	cloud	liquid/solid
Container C	surface water	liquid
Container D	groundwater	liquid
Container E	groundwater	liquid
Container F	surface water	liquid
Pipe 1	discharge	liquid
Pipe 2	evaporation	gas
Pipe 3	condensation	gas → liquid
Pipe 4	precipitation	liquid
Pipe 5	infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

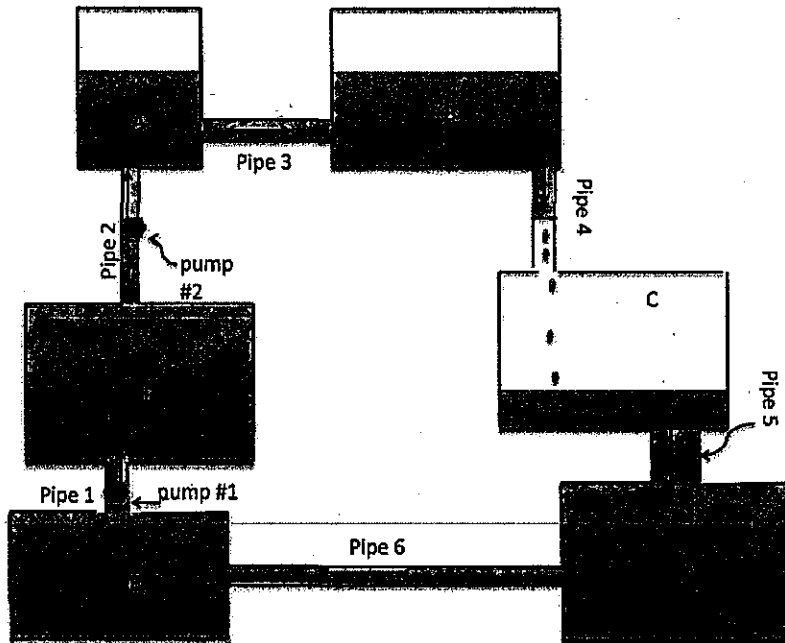
Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Once water becomes evaporated it would have no way out of the gas phase due to the stoppage of condensation.

Water in streams would discharge into groundwater until evaporated but without condensation precipitation could not occur.

Part 2: Group Work

Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	atmosphere	gas
Container B	cloud	liquid
Container C	surface water	liquid
Container D	Groundwater	liquid
Container E	stream	liquid
Container F	lake	liquid
Pipe 1	discharge	liquid
Pipe 2	evaporation	liquid → gas
Pipe 3	condensation	gas → liquid
Pipe 4	precipitation	liquid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

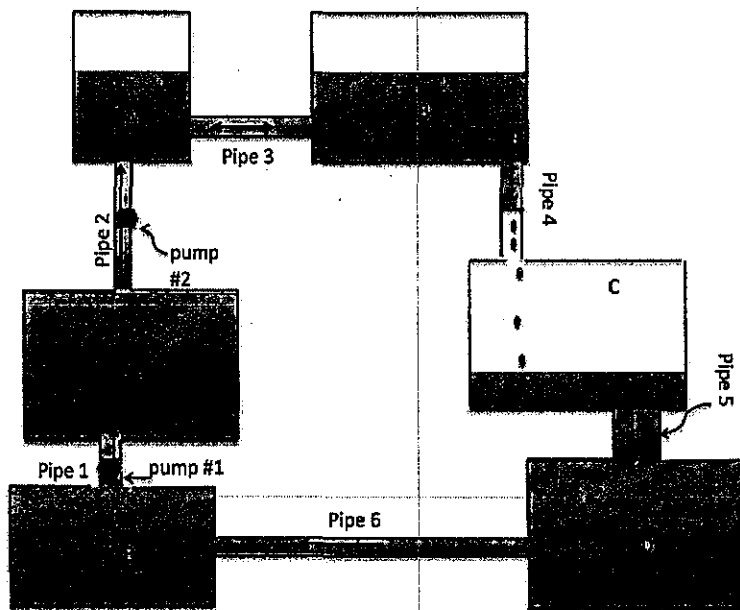
Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	
Water is pumped in Pipe 2	Energy is used for evaporation	
Water drips in Pipe 4	Precipitation	
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

GROUP #:
GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	atmosphere	vapor
Container B	cloud	liquid
Container C	surface water	liquid
Container D	Groundwater	liquid
Container E	Stream	liquid
Container F	Lake	liquid
Pipe 1	discharge	liquid
Pipe 2	evaporation	liquid to gas
Pipe 3	condensation	gas to liquid
Pipe 4	precipitation	liquid / solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Part 2: Group Work**Causal Principles**

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

No clouds would form which would
end precipitation - slowing the flow
of stream water

15

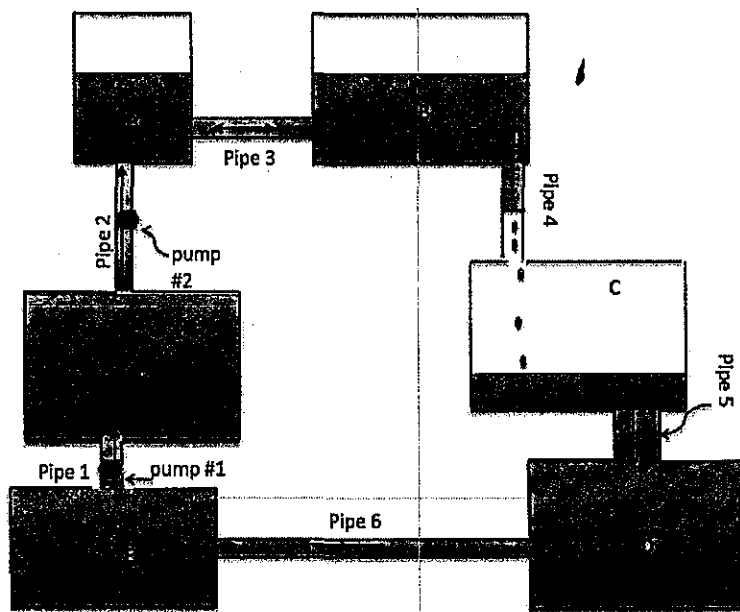
ISP203A – Global Change
Part 2: Group Work

Reservoirs

15

GROUP #: 15

GROUP MEMBERS PRESENT: [REDACTED]



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Atmosphere/w. vapor	gas
Container B	liquid water/cloud	liquid
Container C	surface water/stream	liquid
Container D	Groundwater	liquid
Container E	Groundwater	liquid
Container F	lake	liquid
Pipe 1	infiltration/recharge	liquid
Pipe 2	Evaporation	gas
Pipe 3	Condensation	gas - liquid
Pipe 4	Precipitation	liquid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	1
Water is pumped in Pipe 2	Energy is used for evaporation	1, 4, 5
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2, 3

Question:

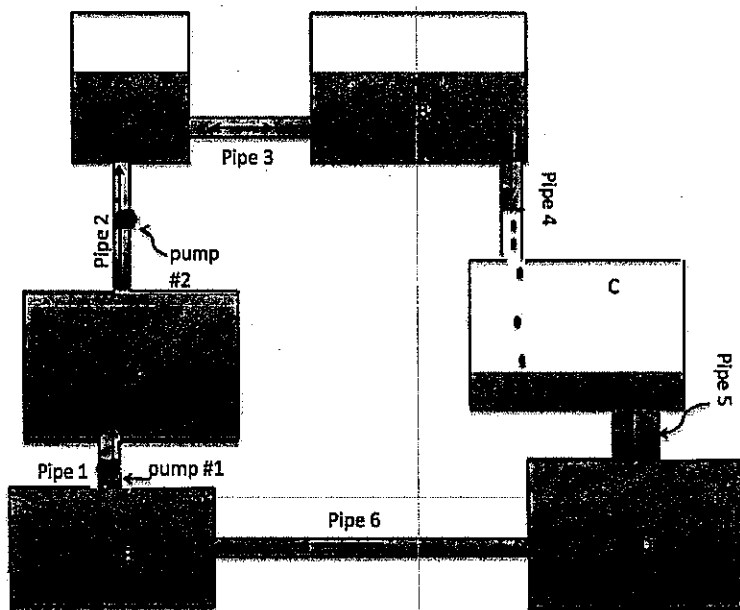
A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

The disruption of the water cycle will make the streams dry up.

The water vapor will stay in the air clouds will disappear

GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Container A = atmosphere

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	groundwater	gas
Container B	cloud	liquid
Container C	surface water	liquid / solid
Container D	Groundwater	liquid / solid
Container E	Stream	liquid / solid
Container F	lake	liquid / solid
Pipe 1	discharge	liquid
Pipe 2	evaporation	liquid → gas
Pipe 3	condensation	gas → liquid
Pipe 4	precipitation	liquid / solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	returning to equilibrium
Water is pumped in Pipe 2	Energy is used for evaporation	temperature
Water drips in Pipe 4	Precipitation	gravitational energy
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	balanced equilibrium

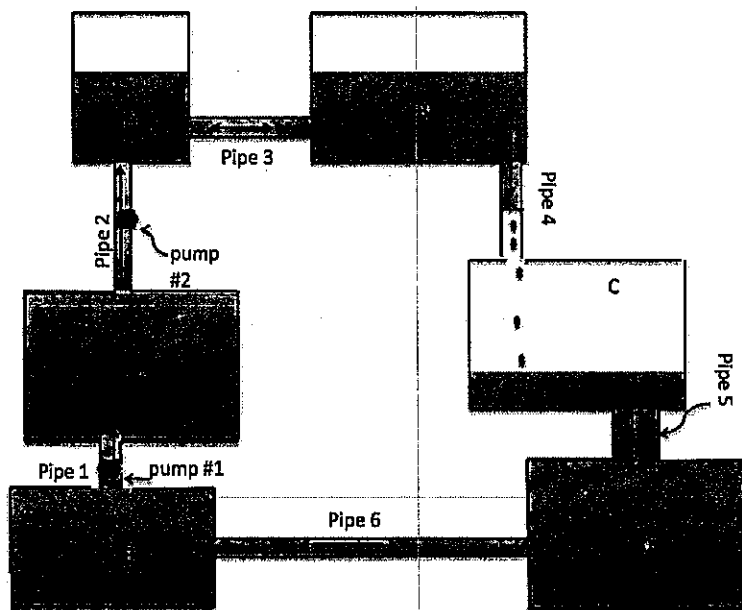
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

If condensation stopped, precipitation would stop which would affect the recharge of surface water + ground water, stopping the water cycle.

GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container ~~A~~ now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Vapor atmosphere	Gas
Container B	Liquid water - clouds ^{clouds}	gas - liquid
Container C	liquid on surface	liquid
Container D	Groundwater	liquid
Container E	Stream	liquid
Container F	lake	liquid
Pipe 1	discharge	liquid - liquid
Pipe 2	evaporation	liquid - gas
Pipe 3	condensation	Gas - Liquid
Pipe 4	precipitation	liquid - solid
Pipe 5	Infiltration	liquid - liquid
Pipe 6	discharge	liquid - liquid

Part 2: Group Work**Causal Principles**

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	2
Water is pumped in Pipe 2	Energy is used for evaporation	1
Water drips in Pipe 4	Precipitation	5
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	3

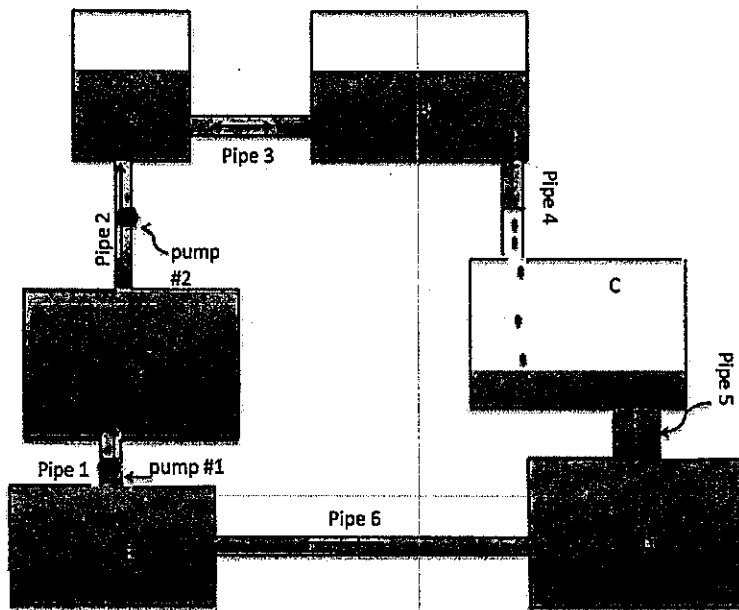
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

No condensation in the atmosphere would result in no precipitation, which would mean streams would dry up.

GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Atmosphere	gas
Container B	Cloud	liquid
Container C	Surface water	liquid
Container D	Groundwater	liquid
Container E	Stream	liquid
Container F	Lake	liquid
Pipe 1	discharge	liquid
Pipe 2	Evaporation	gas
Pipe 3	condensation	liquid
Pipe 4	Precipitation	liquid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	
Water is pumped in Pipe 2	Energy is used for evaporation	
Water drips in Pipe 4	Precipitation	
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	

Question:

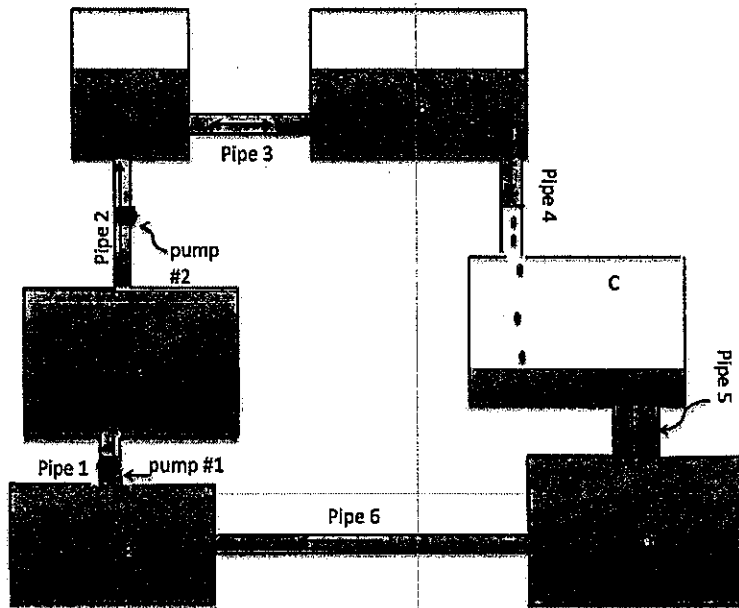
A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

GROUP #: 21

GROUP MEMBERS PRESENT:

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Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Vapor in Atmosphere	Vapor
Container B	liquid in Clouds	liquid
Container C	Surface water	liquid
Container D	Groundwater	liquid
Container E	Stream	liquid
Container F	Lake	liquid
Pipe 1	discharge	liquid
Pipe 2	evaporation	Solid, liquid / gas
Pipe 3	Condensation	Vapor / liquid
Pipe 4	Precipitation	liquid or solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	
Water is pumped in Pipe 2	Energy is used for evaporation	
Water drips in Pipe 4	Precipitation	
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

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ISP203A – Global Change Reservoirs

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	1
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1, 4
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	1, 2, 3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Rivers and streams would dry up due to no precipitation to recharge them.

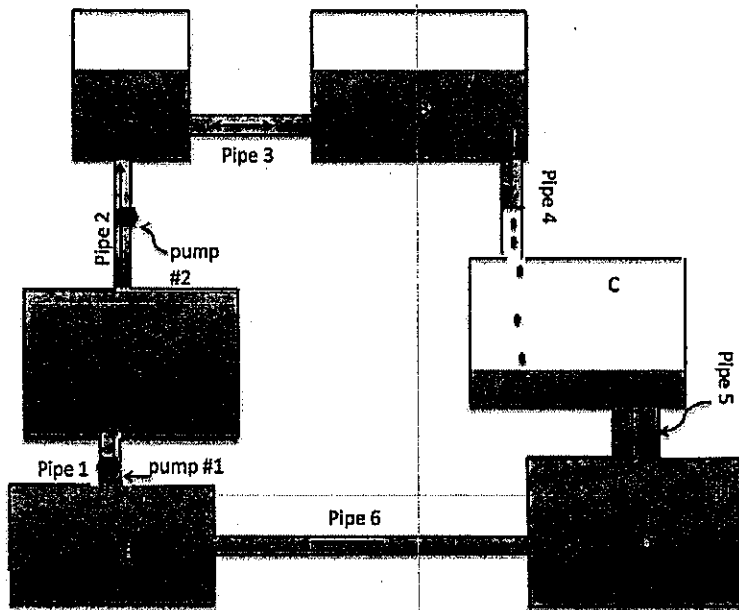
22

ISP203A – Global Change
Part 2: Group Work

Reservoirs

GROUP #: 22

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Water Vapor in Atmosphere	Gas
Container B	Liquid Water	Liquid
Container C	Surface water	Liquid/snow
Container D	Groundwater	Liquid
Container E	Stream	Liquid
Container F	Lake	Liquid
Pipe 1	Runoff	Liquid
Pipe 2	Evaporation	Liquid to gas
Pipe 3	Condensation	gas to liquid
Pipe 4	Precipitation	Liquid/Solid
Pipe 5	Infiltration	Liquid
Pipe 6	discharge	Liquid

Part 2: Group Work**Causal Principles**

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle.

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2 or 3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Water flow would decrease due to decreased precipitation which would occur because water vapor wouldn't condense into liquid water.

Part 2: Group Work

Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

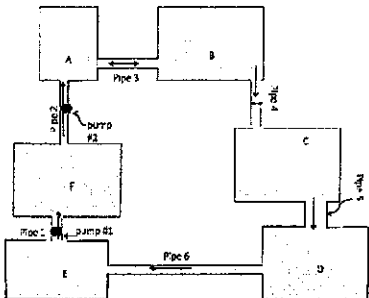


Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	water vapor in atmosphere	gas
Container B	cloud	Liquid
Container C	surface water	Liquid
Container D	Groundwater	Liquid
Container E	liquid water @ surface place	liquid
Container F	water vapor in atmosphere	gas
Pipe 1	evaporation	gas
Pipe 2	Condensation	Liquid to gas
Pipe 3	desublimation	Solid to Liquid
Pipe 4	Runoff	liquid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

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ISP203A – Global Change
Reservoirs

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	# 3
Water is pumped in Pipe 2	Energy is used for evaporation	# 4
Water drips in Pipe 4	Precipitation	# 1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	# 3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

If the process of condensation stopped, the water in the streams will receive no discharge from groundwater, which in return wouldn't be recharged by precipitation. This would ultimately lead to drying of streams & the through of the water cycle.

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Group 24

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Part 2: Group Work

Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

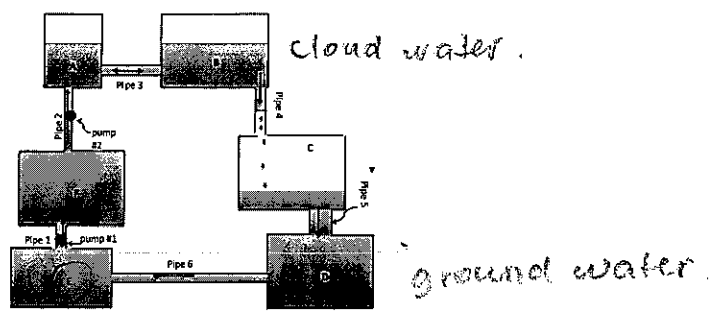


Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	vapor in atmosph	gas.
Container B	liquid in cloud	liquid / solid
Container C	surface water	liquid / solid.
Container D	Groundwater	liquid.
Container E	stream	liquid.
Container F	ocean.	liquid.
Pipe 1	discharge.	liquid.
Pipe 2	evaporation.	liquid to gas
Pipe 3	condensation.	gas to liquid.
Pipe 4	precipitation.	liquid / solid.
Pipe 5	Infiltration	liquid.
Pipe 6	discharge	liquid.



3/3

ISP203A – Global Change Reservoirs

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	Principle 2: Equilibrium
Water is pumped in Pipe 2	Energy is used for evaporation	Principle 4: Energy is needed to break bonds.
Water drips in Pipe 4	Precipitation	gravitational energy principle 1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	Principle 2 or/4 3.

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

4

Less precipitation. Slows down the water cycle on the surface, less water on the surface. Since condensation stops & gas to liquid slows down. Less discharge & runoff between the water. Reservoir time decreases.

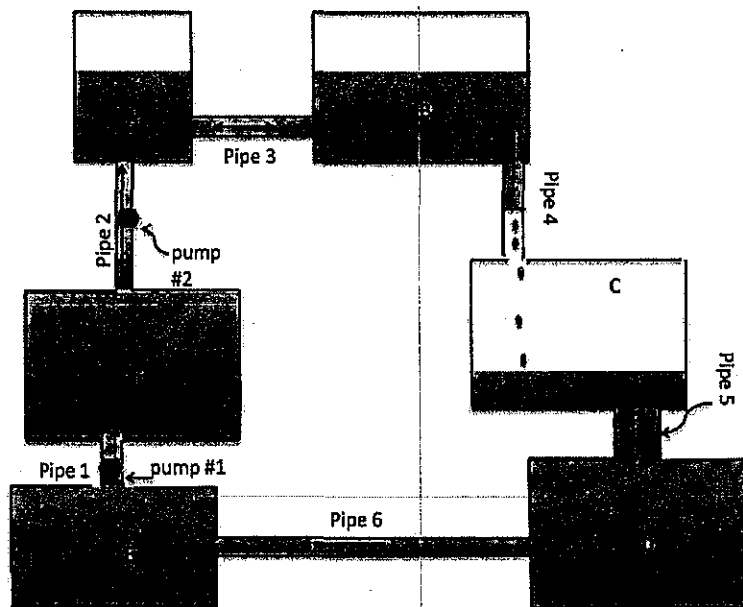
25

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Part 2: Group Work

Reservoirs

GROUP #: 25

GROUP MEMBERS PRESENT



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Atmosphere	gas
Container B	Cloud	liquid
Container C	surface water	liquid
Container D	Groundwater	liquid
Container E	Stream	liquid
Container F	Lake	liquid
Pipe 1	Discharge	liquid
Pipe 2	Evaporation	liquid → gas
Pipe 3	Condensation	gas → liquid
Pipe 4	Precipitation	liquid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Part 2: Group Work

All Present.

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	#1, #2, #3, #4, #5
Water is pumped in Pipe 2	Energy is used for evaporation	#1, #2, #3, #4, #5
Water drips in Pipe 4	Precipitation	#1, #2, #3,
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	#2, #3

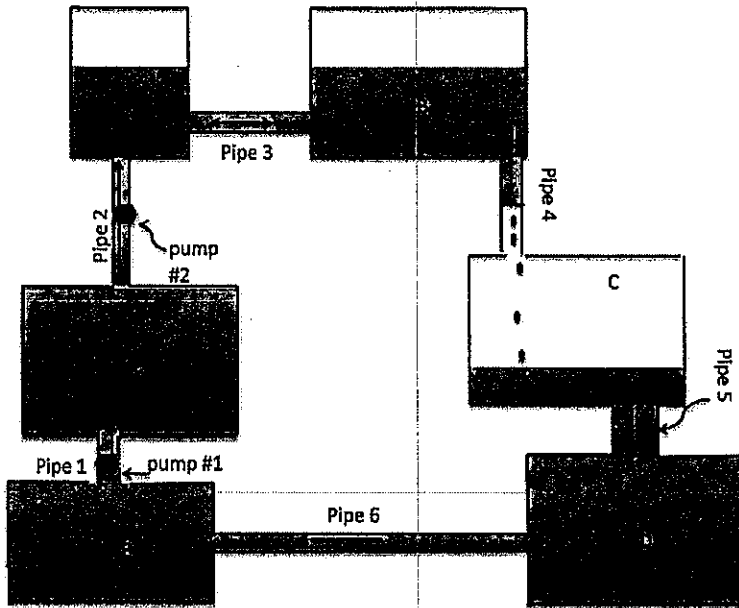
Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

No condensation equals no precipitation equals no ground water.

GROUP #:

GROUP MEMBERS PRESENT:



Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Atmosphere	Gas
Container B	cloud	liquid/solid
Container C	surface water	liquid/solid
Container D	Groundwater	liquid
Container E	stream	liquid
Container F	Lake	liquid
Pipe 1	Discharge	liquid
Pipe 2	Evaporation	liquid → gas
Pipe 3	condensation	gas → liquid
Pipe 4	Precipitation	liquid/solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

If condensation stopped, precipitation would cease as well. Therefore no precipitation would fall into streams - eventually depleting all of the water in streams. The existing water from before the stoppage of condensation would either flow into lakes or evaporate.

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Reservoirs

#28

Part 2: Group Work

Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

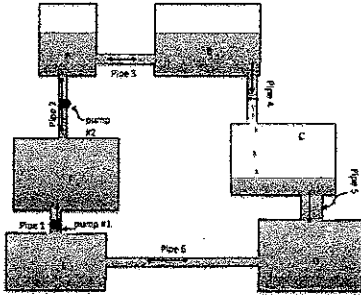


Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	Atmosphere	Gas
Container B	Cloud	Liquid
Container C	Surface water	Liquid
Container D	Groundwater	Liquid
Container E	Lake Stream	Liquid
Container F	lake	Liquid
Pipe 1	Discharge	Liquid
Pipe 2	Evaporation	Liquid \Rightarrow Gas
Pipe 3	Condensation	Gas \Rightarrow Liquid
Pipe 4	Precipitation	Liquid
Pipe 5	Infiltration	Liquid
Pipe 6	discharge	Liquid

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	1
Water is pumped in Pipe 2	Energy is used for evaporation	5, 4
Water drips in Pipe 4	Precipitation	1. Gravitational Energy
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	3

Question:

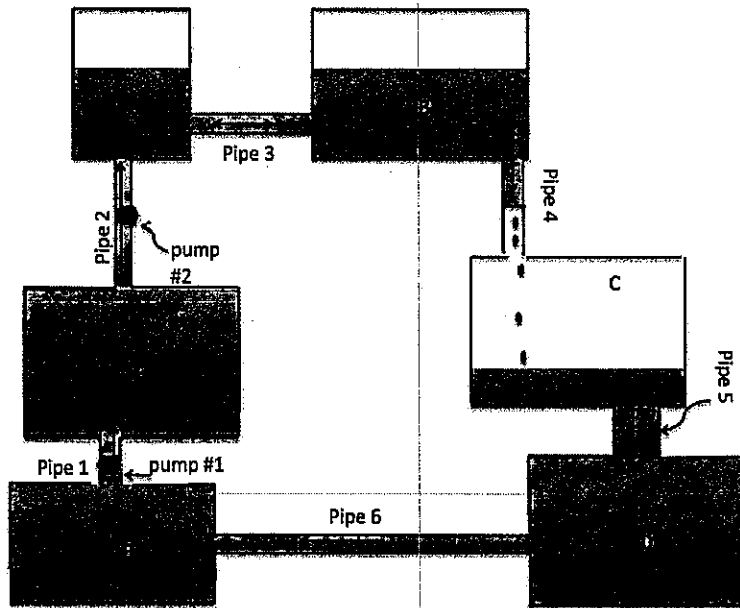
A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Eventually all processes in the water cycle would stop.

GROUP #:

GROUP MEMBERS PRESENT:

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Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	gas in atmosphere	gas
Container B	liquid in cloud	liquid
Container C	surface water	liquid/solid
Container D	Groundwater	liquid
Container E	stream	liquid
Container F	lake	liquid
Pipe 1	runoff/discharge	liquid
Pipe 2	evaporation	liquid → gas
Pipe 3	condensation	gas → liquid
Pipe 4	precipitation	liquid/solid
Pipe 5	Infiltration	liquid
Pipe 6	discharge	liquid

Part 2: Group Work**Causal Principles**

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	#3
Water is pumped in Pipe 2	Energy is used for evaporation	#4
Water drips in Pipe 4	Precipitation	#1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	#2, 3

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

It would eventually all stop because the gas wouldn't be able to condense into a liquid to fall back to the surface to continue the cycle.

30

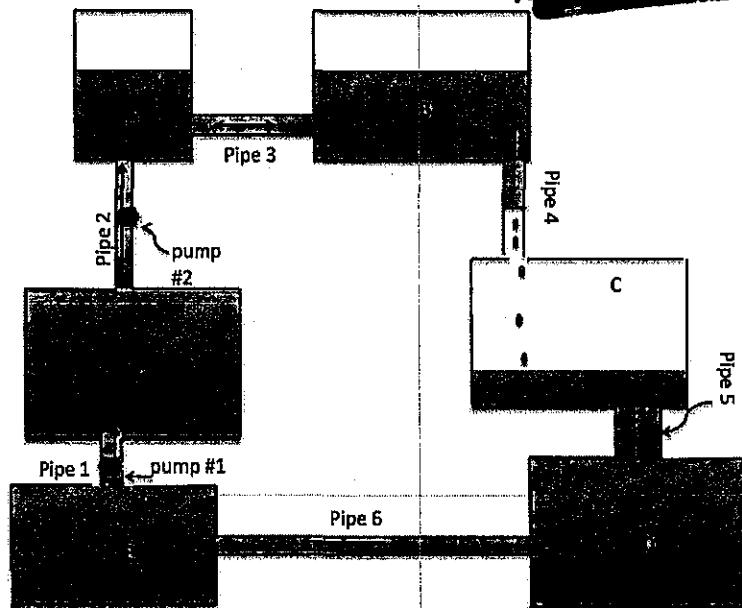
ISP203A – Global Change
Part 2: Group Work

GROUP #: 30

GROUP MEMBERS PRESENT: T

Reservoirs

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Fill in Table B in the same way we filled in Table A together, but with container A now analogous to groundwater. The terms that you will use include: *stream, atmosphere, condensation, surface water, discharge, evaporation, lake, cloud, precipitation.*

Table B. Aligning the system to the water cycle including groundwater.

Simple system	Water cycle	Phase
Container A	atmosphere	gas
Container B	Cloud	liquid
Container C	Surface water	liquid
Container D	Groundwater	liquid
Container E	stream	liquid
Container F	lake	liquid
Pipe 1	Discharge	liquid - liquid
Pipe 2	Evaporation	liquid - gas
Pipe 3	Condensation	gas - liquid
Pipe 4	precipitation	liquid - liquid
Pipe 5	Infiltration	liquid - liquid
Pipe 6	discharge	liquid - liquid

Part 2: Group Work

Causal Principles

When components of two domains are analogous, a common principle can be used to describe both. For every corresponding pair of components in Table C, identify the causal principle the two processes have in common.

Table C. Causal principles related to the water cycle

Simple system	Water cycle	Causal Principle
Water moves between containers	Water moves between reservoirs	3
Water is pumped in Pipe 2	Energy is used for evaporation	4
Water drips in Pipe 4	Precipitation	1
Water flows in one or two directions between containers.	Water may flow in one or two directions between reservoirs.	2

Question:

A. Imagine the process of condensation in Earth's atmosphere stops. How would this affect flow of water in streams? Use the steps of the water cycle to explain your reasoning.

Clouds wouldn't condense there fore more sunlight. would cause higher transpiration rates which would effect ground water storage & thus surface runoff & streams.

However no precipitation. ~~however~~ lakes & streams predominately feed of precipitation ex:
the Amazon